Contents

Figures

Tables

4. The Proposed Development

4.1. Introduction

4.1.1. The Proposed Development comprises the construction, operation (including maintenance) and eventual decommissioning of a high-efficiency combined cycle gas turbine (CCGT) electricity generating station with a capacity of up to 910MW electrical output to be located on land at, and in the vicinity of the existing Keadby Power Stations (Keadby 1 and Keadby 2) near Scunthorpe in North Lincolnshire ('the Site').

4.1.2. The CCGT generating station will be designed to run on 100% hydrogen. To enable 100% firing on hydrogen, this would require hydrogen production facilities and transport infrastructure to be developed by third parties; this infrastructure does not form part of this consent application.

4.1.3. SSE has formed a partnership with Equinor (a future hydrogen supplier) to develop the Proposed Development. Hydrogen production, storage and supply infrastructure is being developed by SSE, Equinor and others in parallel with the DCO application for the Proposed Development. This parallel approach is recognised to be critical to the timely decarbonisation of the power sector in accordance with Government policy. Further information on the operation of the Proposed Development is provided in Section 4.4. Cumulative environmental effects of the Proposed Development and other developments are considered in **Environmental Statement (ES) Volume I Chapter 21**: Cumulative and Combined Effects **(Application Document Ref. 6.2).**

4.1.4. The Proposed Development is therefore being progressed in parallel with the development of hydrogen fuel infrastructure for the following reasons:

- It is anticipated that security of electricity supply will be a key national topic, especially from the early 2030s and the Proposed Development will contribute to this objective – to this end, the Proposed Development requires to complete early project development activities in the mid-2020s such that delivery can be completed by the early 2030s.
- If a Final Investment Decision is taken in the late 2020s and the Proposed Development is in operation by the early 2030s, this will provide an additional driver to accelerate and provide certainty to hydrogen production, storage and transport infrastructure projects in the Humber, due to being a hydrogen-enabled large scale offtaker and potential customer.
- The Proposed Development will ensure the earliest possible decarbonisation of the electricity system, by ensuring that the technology is hydrogen-enabled, and switchover from natural gas to hydrogen can occur with minimal outage time as soon as the fuel is available, rather than awaiting fuel availability to commence development.

4.1.5. Given the above, it is currently anticipated that the required hydrogen supply infrastructure may not be available at the start of operation, in which case the Proposed Development would also need to be able to operate using 100% natural gas or blends of hydrogen and natural gas until such time as a commercially viable and reliable hydrogen supply becomes available to the Site.

4.1.6. The Proposed Development will therefore require hydrogen and natural gas, as well as electricity and cooling water connections. It will be designed to operate as both a baseload or flexible (dispatchable) generating station, but it is expected that the Proposed Development will operate in flexible mode. Baseload mode refers to power generation that generally runs continuously throughout the year and whereby the CCGT plant is operated at stable power output levels. Dispatchable mode generation refers to highly flexible operation when the Proposed Development will be on demand and dispatched according to market conditions and needs – generally to provide electricity when intermittent renewable technologies cannot meet demand.

4.1.7. A schematic of the Proposed Development is shown in **Plate 4.1**.

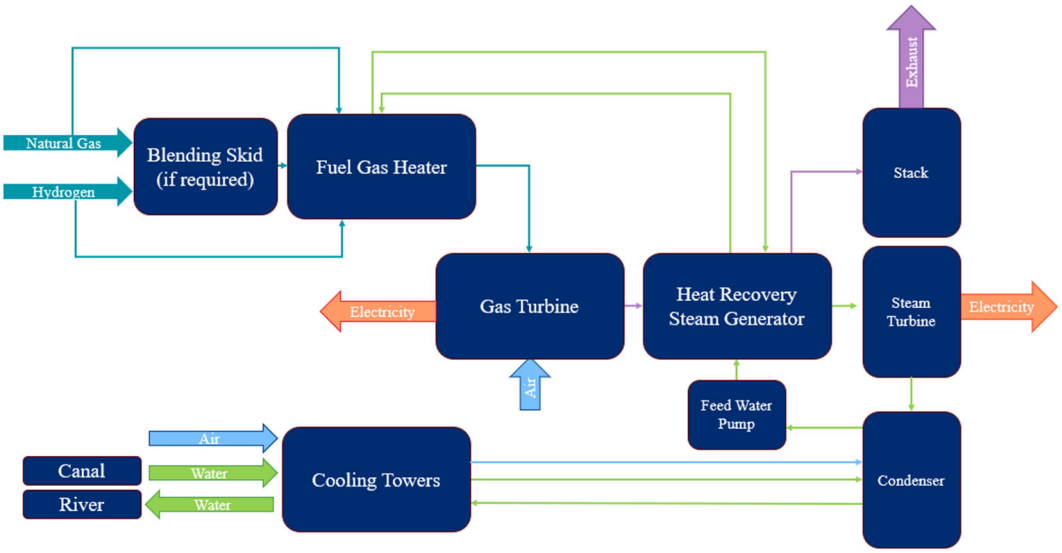

Plate 4.1 Power Generation Process (for multi-shaft generation module)

4.1.8. In accordance with the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013, even though the Proposed Development's decarbonisation pathway is hydrogen-firing, land will need to be set aside within the Site for Carbon Capture Readiness (CCR). This requirement is expected to be replaced by Hydrogen Readiness requirements when the Decarbonisation Readiness Guidance is adopted, but this is currently anticipated to be after the submission of the DCO application. Therefore, in the intermediate period, the Site includes land set aside to meet the CCR

obligation (**Work No. 11** on the **Works Plans** (**Application Document Ref. 2.3**)).

4.1.9. The Proposed Development is an alternative to the consented Keadby CCS Power Station and would be located on the same plot of land. Whilst the consented Keadby CCS Power Station would be CCS-enabled, the Proposed Development is for an alternative low carbon CCGT technology using hydrogen. Hydrogen firing was considered as an alternative low carbon technology pathway at the EIA Scoping stage of the Keadby CCS DCO application. This option was not taken forward at that time because at that stage the Zero Carbon Humber Cluster carbon dioxide pipeline had progressed further than the hydrogen supply option, and the timescale for supply of hydrogen to the site was uncertain. Whilst some uncertainty remains in the development timelines of the infrastructure required to operate carbon capture enabled and hydrogen-fired power stations, the Applicant considers that the most effective and quickest way to decarbonise electricity generation is to construct power stations which are enabled to decarbonise by the most viable means, technically and economically and hence is seeking consent for the Proposed Development in order to develop the option of constructing and operating a hydrogen-fired CCGT on the Keadby CCS Power Station site. Further information on the alternatives considered is presented in **ES Volume I Chapter 6**: Consideration of Alternatives (**Application Document Ref. 6.2**).

4.2. Proposed Development

4.2.1. The Proposed Development includes the following elements (note references to Work Nos. relate to the **Works Plans** (**Application Document Ref. 2.3**)):

- a new-build CCGT electricity generating station fuelled by hydrogen and/or natural gas with a power output of up to 910MW (**Work No. 1**) including:
  - a CCGT plant;
  - cooling infrastructure;
  - natural gas and hydrogen blending equipment;
  - supporting facilities including administration and control buildings, workshops, storage buildings, effluent treatment facilities, fire water storage tank(s), demineralised water treatment plant including storage tank(s), and permanent laydown areas for operation and maintenance activities;
- a hydrogen supply pipeline, including a gas compound for the hydrogen supplier's apparatus and a hydrogen gas compound for the Applicant's apparatus (**Work No. 2**);
- a natural gas supply pipeline including a compound for the natural gas supplier's apparatus and a natural gas compound for the Applicant's apparatus (**Work No. 3**);

- electrical connection works for the export and import of electricity to and from the generating station and the existing 400kV National Grid Electricity Transmission (NGET) substation located adjacent to the Keadby Power Station site, including works within the substation (which would be undertaken by NGET) (**Work No. 4**);
- water supply connection works to provide cooling and make-up water to the generating station, including intake structures and an underground and/or overground water supply pipeline running between the generating station and the Stainforth and Keadby Canal (**Work No. 5**);
- connections to and use of an existing outfall and associated pipework for the discharge of used cooling water, surface water and treated effluent to the River Trent (**Work No. 6**);
- public water connection pipeline from a new connection on Chapel Lane to provide potable water to the generating station (**Work No. 7**);
- new permanent access to the generating station (**Work No. 8**), comprising:
  - maintenance and improvement of an existing private access road from the A18, including replacement of a private bridge (Mabey Bridge) (**Work No. 8A**);
  - installation of layby and gatehouse with barriers, enclosures, drainage and lighting north of the A18 junction (**Work No. 8B**) and associated utilities connections (**Work No. 8C**); and
  - emergency access route comprising the maintenance and improvement of an existing private track running between the generating station and Chapel Lane and including new private bridge crossing over Glew Drain (**Work No. 8D**);
- temporary construction and laydown areas (**Work No. 9A**);
- maintenance and improvement of the existing access routes running between the A18 and construction laydown areas (**Work No. 9B**); and between Skew Bridge adjacent to the A18 and a temporary construction laydown area associated with Mabey Bridge replacement (**Work No. 9C**);
- retention, maintenance and improvement and subsequent removal of existing temporary haul route from the Waterborne Transport Offloading Facility (**Work No. 9D**) and the inspection and repair if necessary, of the existing wharf, and temporary placement of mobile cranes including the temporary oversailing of crane arms (**Work No. 9E**); and
- landscaping and biodiversity enhancement measures (**Work No. 10**);
- an allocation of land to meet the requirements of the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013 (**Work No. 11**).

4.2.2. To the extent that it does not form part of any of the above works, further associated development within the meaning of the Planning Act 2008 is proposed and has been assessed within this ES comprising:

- surface water drainage systems, including works to existing drainage systems;
- electrical, gas, potable water supply, foul water drainage and telecommunications infrastructure connections and works, and works to alter the position of such services and utilities connections;
- hard standings and hard landscaping;
- soft landscaping, including bunds and embankments;
- external lighting, including lighting columns;
- closed circuit television cameras and columns and other security measures;
- site establishment and preparation works, including site clearance, demolition works, earthworks and excavations; land raising; temporary construction access; alteration of services and utilities; and works for the protection of buildings and land;
- temporary construction laydown areas and contractor facilities, including materials and plant storage and laydown areas; generators; concrete batching facilities; vehicle and cycle parking facilities; pedestrian and cycle routes and facilities; offices and staff welfare facilities; security fencing and gates; external lighting; roadways and haul routes; wheel wash facilities; and signage;
- vehicle parking, including secure cycle storage facilities;
- accesses, roads and pedestrian and cycle routes;
- security fencing and boundary treatment; and
- temporary works associated with the maintenance of the authorised development.

4.2.3. Each part of the Proposed Development is described in further detail below. The maximum dimensions of each component are detailed in Section 4.3 of this chapter.

4.2.4. The locations of the elements of the Proposed Development described above within the Site are shown in an Indicative Layout Plan at **ES Volume III Figure 4.1:** Indicative Layout of Main Site and Ancillary Facilities (**Application Document Ref. 6.4**) and the **Works Plans** (**Application Document Ref. 2.3**).

4.2.5. For ease of reference in the ES, parts of the Site are described using the terms introduced in **ES Volume I Chapter 3**: The Site and Surrounding Area, paragraph 3.2.3 (**Application Document Ref 6.2**) and illustrated on **ES Volume III Figure 3.3**: Indicative Parts of the Site (**Application Document Ref. 6.4.4**). The parts of the Site referred to in the ES are:

- Main Site;
- Ancillary Facilities;
- Water Connections (comprising the Water Abstraction Corridor, the Public Water Connection and the Water Discharge Corridor);
- Electrical Connections;

- Waterborne Transport Off-loading Area;
- Construction Laydown Areas;
- Access routes (comprising the Access Road, Skew Construction Access Route, Emergency Access Route and Construction Access Haul Route);
- A18 Gatehouse Utility Connections; and
- Potential Biodiversity Mitigation and Enhancement Area.

4.2.6. The Proposed Development is a 'first of a kind' for this type of power station infrastructure project and could represent the UK's first hydrogen-fired power station. Consequently, at this consenting stage of the project, a number of the design aspects and features of the Proposed Development cannot be confirmed until the detailed design of the Proposed Development has been completed. For example, the building sizes may vary, depending on the Engineering, Procurement and Construction ('EPC') contractors selected and their specific configuration and selection of plant and equipment. It is also important that the consent retains some flexibility to allow for changing economic conditions and the advancement of hydrogen-fired CCGT technology in the period between preparing the Application, starting construction and starting hydrogen and/or natural gas -fired operations.

4.2.7. In order to ensure a robust assessment of the likely significance of the environmental effects of the Proposed Development, the EIA has been undertaken adopting the principles of the 'Rochdale Envelope' approach, where appropriate in accordance with the Planning Inspectorate's Advice Note 9: The Rochdale Envelope (PINS, 2018). This involves assessing the maximum (or where relevant, minimum) parameters for the elements where flexibility needs to be retained (such as the building dimensions or operational modes for example). Where this approach has been applied to the specific aspects of the EIA, this is confirmed within the relevant chapters of this ES.

4.2.8. Justification for the need to retain flexibility in certain parameters is outlined in this chapter and also in **ES Volume I Chapter 6:** Consideration of Alternatives (**Application Document Ref. 6.2**). As such, this ES presents a reasonable worst-case assessment of the potential impacts of the Proposed Development at its current stage of design.

4.2.9. Construction of the Proposed Development is described in **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**)**.** At this stage in the project development, a detailed construction programme is not available as this is normally determined by the EPC contractor(s) which has/ have not yet been appointed; however, an indicative construction programme is presented within **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref 6.2**) on which the potential environmental effects of the Proposed Development are being assessed.

4.2.10. Construction of the Proposed Development could (subject to the necessary consents being granted and an investment decision being made) start in 2027. Assuming an approximate three and a half year construction programme followed by a period of commissioning, the Proposed Development is unlikely to commence commercial operation before 2030.

4.2.11. It is envisaged that the Proposed Development will be designed to operate for at least 25 years. At this stage, it is expected that the Proposed Development will have some residual life remaining, and an investment decision would then be made based on an assessment of the technical feasibility and the market conditions prevailing at that time.

4.2.12. At the end of its operating life, the most likely scenario is that the Proposed Development would be decommissioned as outlined in Section 4.6 below. This ES has assumed that the Proposed Development could operate for longer than 25 years, and in relevant chapters has considered and assessed the potential for operational impacts/ effects to continue beyond this timeframe. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time.

4.2.13. A **Combined Heat and Power (CHP) Assessment** (**Application Document Ref 5.8**) has been prepared to accompany the Application to consider the feasibility of installing CHP. There are a number of theoretical identified heat users within a 15km radius of the Site. Although there are large heat loads related to domestic, small industrial and education within the study area, none of these currently offer economically viable opportunities for a heat network. CHP is therefore not proposed to be installed from the outset, but the Proposed Development will be CHP ready, with the inclusion of connection flanges at suitable locations to export waste heat in the future should this become viable. This is considered to be Best Available Technique (BAT) for plant such as the Proposed Development.

4.3. Components of the Proposed Development

4.3.1. This section provides further detail on the components of the Proposed Development within the Site. A description of the different areas of the Site is provided within **ES Volume I Chapter 3:** The Site and Surrounding Area (**Application Document Ref. 6.2**) and these are illustrated on the accompanying **ES Volume III Figure 3.3:** Indicative Parts of the Site Plan (**Application Document Ref. 6.4**).

The Main Site and Ancillary Facilities

4.3.2. The Proposed Development will comprise a single high efficiency CCGT unit to be developed on the Main Site with some Ancillary Facilities located to the south and south-east of the Main Site as shown on **ES Volume III Figure 3.3:** Indicative Parts of the Site Plan (**Application Document Ref. 6.4**),

Figure 4.1: Main Site Layout (**Application Document Ref. 6.4**) and the **Works Plans** (**Application Document Ref. 2.3**).

4.3.3. Given the first-of-a-kind nature of the Proposed Development (refer to paragraph 4.2.6), the design assessed in this ES is based on a range of the most likely CCGT equipment to be used; this means that there may be a range of electrical output depending on the technology selected; at this stage in project design therefore, the largest unit currently commercially available has been selected as the conservative basis for assessments, unless otherwise stated. Although the generating capacity of the Proposed Development is up to 910MW, in practice the power output is anticipated to be limited to 892MW by the Grid Connection.

4.3.4. The layout of the Main Site is illustrated on **ES Volume III Figure 4.1:** Main Site Layout (**Application Document Ref. 6.4**) and will encompass:

- a gas turbine and associated generator;
- a heat recovery steam generator (HRSG);
- a steam turbine and associated generator;
- gas and steam turbine buildings;
- gas turbine air intake filters;
- selective catalytic reduction (SCR) equipment for the removal of nitrogen oxides (NO_x) from the flue gas (if required), consisting of a catalyst chamber, associated pipework, fans and reagent storage vessels;
- cooling infrastructure, comprising hybrid cooling towers and associated pipework, plant and buildings;
- hydrogen supplier and Applicant AGIs, gas conditioning and pressure regulation, metering equipment and instrumentation and electrical building (hydrogen storage for fuelling will not be provided at the Site);
- natural gas supplier and Applicant AGIs, gas conditioning and pressure regulation, metering equipment and instrumentation and electrical building;
- natural gas and hydrogen blending equipment;
- stack(s) for the discharge of flue gas;
- a continuous emissions monitoring system (CEMS);
- transformers (for the import and export of electricity); and
- facilities required in connection with the above including: an auxiliary boiler, an emergency generator and associated fuel storage tanks (if required – depending on the type of emergency generator); water treatment plants and facilities; and ancillary equipment (including air compressors, pumps, chemical storage, above ground demineralised and fire water storage tanks and associated infrastructure).

4.3.5. The Main Site and Ancillary Facilities will also include:

- a gatehouse, security building and staff parking;
- permanent plant laydown area for operation and maintenance activities;
- administration, control and stores buildings; and

- a surface water drainage system comprising pond(s) and/ or tank(s) or similar.

4.3.6. The administration/ control building(s) will contain the main reception, offices, control room, electrical equipment and staff welfare facilities.

4.3.7. Storage building(s) will be required for operation and maintenance activities and storage of materials.

4.3.8. There will be provision for several vehicle parking spaces, motorcycle parking and secure cycle storage on-site for operational use. Additional car parking spaces would be provided to support outages, if required.

4.3.9. Three decommissioned heavy fuel oil tanks (formerly used for Keadby 1 Power Station) located within the Ancillary Facilities area to the south-east of the Main Site will be demolished to provide space for Ancillary Facilities including the administration/ control building(s) and the storage building(s). See **ES Volume I Chapter 5:** Construction Programme and Management (**Application Document Ref. 6.2**)**,** paragraph 5.4.5 for further information.

4.3.10. Each of the main components of the Main Site is described below.

Power Generation and Associated Stack

4.3.11. Hydrogen and/ or natural gas that has been conditioned to the required temperature and pressure in the respective reception facilities will be combusted in the CCGT. The gas turbine selected will be provided with Dry Low NO_x (DLN) burners to minimise the formation of NO_x.

4.3.12. Following combustion in the gas turbine, the hot product gases expand across the blades of the turbine causing it to rotate and drive an electrical generator. The gas turbine exhaust gases are passed through the HRSG to recover the useful heat in order to produce steam (at various pressures) which is used to generate further power via a separate steam turbine.

4.3.13. The flue gases may then need to be further treated with SCR to further remove NO_x to the required emissions limits. The SCR will be supplied with urea or aqueous ammonia feedstock to treat the flue gas NO_x which will be converted into nitrogen and water vapour in the flue gas.

4.3.14. Steam exhausting from the steam turbine will be cooled and condensed, with the condensate returned to the steam-water cycle of the HRSG for continued re-use. Water used within this steam/ water cycle will be dosed to control pH and dissolved O_2. To further manage this, it will be necessary to intermittently purge a small amount of the boiler water (known as ‘blowdown’) to the cooling tower basin. Blowdown water removed from the cycle will be replaced with fresh demineralised water.

4.3.15. The condensation of steam exiting the steam turbine will be achieved using cooling water from the wet/ dry (hybrid) cooling towers. The cooling towers

are specifically designed to minimise the formation of visible plumes, although some may occur dependent on the ambient weather conditions.

4.3.16. An emergency generator is required in order to provide a short-term source of electricity, in the event of a simultaneous loss of power generation and external power supply, to provide power for up to 72 hours until external power can be re-established.

Selective Catalytic Reduction

4.3.17. Combustion of hydrogen or natural gas is highly efficient and, due to the composition of the fuel, the combustion gases from a typical CCGT plant contain negligible amounts of sulphur dioxide (SO_2) and particulate matter. In addition, the optimisation of combustion within a gas turbine is well understood, such that the emissions of NO_x (and carbon monoxide (CO) for natural gas combustion) are carefully controlled by design and typically through the implementation of primary control measures such as burner design and staged combustion.

4.3.18. In August 2017, revised BAT Conclusions for Large Combustion Plants (LCP) were published, which set out the BAT-Achievable Emission Levels (AEL) for LCP, including new natural gas CCGT. However, as an emerging technology, there are no BAT-AELs for hydrogen-fired CCGTs within the LCP BAT conclusions. As such, the Environment Agency is currently developing Guidance on Emerging Technologies: Oxides of Nitrogen Emissions Limit Values (ELVs) for Combustion of Hydrogen (Environment Agency 2024), which details the application of a correction factor to be applied to the NOx ELVs detailed in the Industrial Emissions Directive (IED) for hydrogen-fired plant, to allow for the increased thermal NOx generation resulting from this mode of firing.

4.3.19. For both gas firing and hydrogen firing, these BAT-AEL/ ELV may not be consistently achievable in high efficiency CCGT plant when only using primary control measures (such as use of DLN burners). SCR may therefore be required to control NO_x levels in the flue gas for both gas and hydrogen firing.

4.3.20. SCR is a secondary abatement technique typically involving either the injection of ammonia or urea into the flue gas to react with any NO_x present in the presence of a catalyst. The SCR equipment would be installed within the HRSG, as is common practice within the power industry.

4.3.21. The level of NO_x removal required in order to achieve the emission limits that will need to be met by the generating station will be determined as part of the detailed design. The design will seek to optimise the operation of the plant in order to maximise efficiency and minimise emissions and waste.

4.3.22. The air quality assessment of NO_x emissions (**ES Volume I Chapter 8**: Air Quality (**Application Document Ref. 6.2**)) has assumed NO_x emissions at

the appropriate BAT-AEL, set out in the BAT Conclusions and the Environment Agency's Emerging Technologies Guidance for proposed different fuels, since as a minimum it is expected that these emission levels must be met.

Hydrogen and Natural Gas (Fuel) Connections and Treatment Infrastructure

4.3.23. The Proposed Development will be designed for the use of hydrogen as the fuel for the operation of the CCGT, but if hydrogen is not available from the start of operation, the Proposed Development will start operation using natural gas as the fuel. There may also be an interim stage of operation using a blend of natural gas and hydrogen, whilst hydrogen supply is fully established. Natural gas and hydrogen connections and treatment infrastructure and fuel blending equipment will therefore be required.

4.3.24. Subject to agreement with the hydrogen supplier, hydrogen will be supplied via a pipeline to the Site. It is currently anticipated that a minimum off-take connection will be constructed, and hydrogen will be transferred via a pipe corridor within the Main Site from a new hydrogen AGI and hydrogen receiving area, where the gas would be metered and conditioned to that required for the Proposed Development.

4.3.25. Subject to agreement with the natural gas supplier, natural gas will be supplied via a tie-in to the existing high pressure gas transmission network on Site. It is currently anticipated that a minimum off-take connection will be constructed, and natural gas will be transferred via a pipe within the Main Site from a new natural gas AGI and natural gas receiving area, where the gas would be metered and conditioned to that required for the Proposed Development.

4.3.26. To facilitate the potential requirement for blending of natural gas and hydrogen, a blending skid will form part of the Proposed Development. The blending skid would manage the proportional mixing of natural gas and hydrogen to allow the Proposed Development to increase the percentage of hydrogen in the fuel mixture as equipment capability, supply infrastructure and fuel availability develop, if 100% hydrogen firing is not possible at the outset. The blending skid will consist of the following equipment:

- Blending ratio control system – to ensure desired blend ratio is monitored and maintained;
- Gas flow meter(s) – to measure and control the flow rates of natural gas and hydrogen to ensure that the desired blend ratio is achieved;
- Control valve(s) – to maintain desired blend ratio;
- Pressure regulator(s) – to ensure that both natural gas and hydrogen are supplied at consistent pressures, preventing fluctuations that could affect the blend ratio and combustion performance;
- Mixing chamber(s); and
- Monitoring instrumentation – to measure parameters such as temperature, pressure, composition, flow rate and Wobbe index.

Electrical Connections

4.3.27. The existing electrical infrastructure in the area comprises 132 kilovolt (kV) and 400 kV overhead lines as well as underground cables that serve existing substations.

4.3.28. In order to import and export electricity from the Proposed Development, a direct connection to the 400kV system will be required. The Proposed Development will connect to the existing NGET 400kV Substation either:

- via a connection directly into the western side of the 400kV Substation to the east of the Main Site; or
- via a connection which will run south from the Main Site, then east towards the administration/ control building and then north in the vicinity of Chapel Lane to connect into the eastern side of the 400kV Substation.

4.3.29. The route option entering the eastern side of the 400kV Substation has been identified since the Preliminary Environmental Information (PEI) Report was published and is the reason for the change to the Site boundary in this area that is identified in paragraph 3.3.2 of **ES Volume I Chapter 3:** The Site and Surrounding Area (**Application Document Ref 6.2**). **ES Volume I Chapter 6:** Consideration of Alternatives (**ES Volume I, Application Document Ref. 6.2**) includes a summary of all refinements to the Proposed Development since the PEI Report was published.

4.3.30. If the connection option entering the east side of the substation is selected, part of the route may be located in publicly accessible land around Chapel Lane. This cable would be buried to a suitable depth to design out offsite electromagnetic field (EMF) effects.

4.3.31. NGET will be responsible for the relevant connection works. No new overhead lines are proposed as part of the works required for the Proposed Development.

Water Connection Works

4.3.32. The Main Site will require a source of cooling water for heat rejection purposes. Process water will also be required in order to provide make-up to the steam/ water cycle of the Proposed Development. There will also be a requirement for water for domestic and sanitary use.

4.3.33. The preferred cooling method, for reasons of operational functionality and performance, is hybrid cooling of the CCGT using water abstracted from the Stainforth and Keadby Canal. An intake structure would be constructed within the canal with equipment to comply with the Eels (England and Wales) Regulations 2009 (HMSO, 2009) ('the Eels Regulations'). The Applicant understands from consultation with the Environment Agency that in order to achieve Best Available Eel Protection, the canal water abstraction infrastructure will require a 2mm mesh screen and an intake velocity < 0.1m/s to protect glass eel and elver. This should negate the need for a fish

recovery and return system, however as the Keadby 2 Power Station canal water abstraction includes a fish recovery and return system, the EIA has assessed the potential need for a fish recovery and return system as a worst case. For the purposes of assessment, it is assumed that this will comprise 2mm multidisc eel screens which prevent debris and fish entering the cooling water system. Multidisc screens would include specially designed fish buckets attached to the screen panels to ensure some water is retained during upward travel thereby allowing any captured fish to survive once the fish buckets exit the water to transport the fish to the fish return line. This structure would use a low pressure pump to minimise the risk to fish as they are returned. This system is similar to that approved by the Environment Agency and that has been constructed for Keadby 2 Power Station. The system also includes intake pipework, a wet well pumping station and chlorination plant. A pipe would be constructed from this inlet into the Main Site initially broadly following the route consented for Keadby CCS Power Station.

4.3.34. The majority of water abstracted from the canal will be supplied directly to cooling towers without pre-treatment. In addition, some of the water will also be supplied directly to the raw water storage tank. Treatment of cooling water is achieved through direct dosing of acid, hardness stabiliser and biocide. The cooling tower system requires a balance of abstraction and discharge to match the losses through evaporative cooling, whilst maintaining dissolved solids at an acceptable level.

4.3.35. The remaining raw water will be directed to the demineralised water treatment plant where it will be processed to produce demineralised water suitable for the steam/water cycle and other consumers of high purity water such as gas turbine wash-water. In addition, some of the water will also be supplied from the demineralised water treatment plant to the fire water storage tank. Discharge water from the demineralised water treatment plant will be treated, if required, and passed to the cooling tower for onwards common discharge.

4.3.36. The Applicant is proposing to re-use existing assets and pipework for Keadby 1 and Keadby 2 Power Stations for the discharge of treated effluent to the River Trent. The route of the existing water discharge connection from Keadby 1 and Keadby 2 Power Stations north-east to the River Trent (and associated easement) is included within the Site. Interconnecting pipework would extend from the Main Site to connect to this infrastructure.

4.3.37. A number of sources of emissions to water may arise from the Proposed Development including (but not limited to):

- Cooling tower discharge (sometimes also referred to as blowdown, separate to boiler blowdown within the CCGT);
- Neutralised (where necessary) effluent streams from the demineralised water treatment plant;

- Blowdown from the CCGT steam/water cycle; and
- Uncontaminated surface water.

4.3.38. Effluent discharges will be regulated by the Environment Agency through the Environmental Permit that will be required for the operation of the Proposed Development; this would be discharged to the River Trent via the existing Keadby Power Station outfall.

4.3.39. Surface water will be appropriately segregated, treated and attenuated prior to discharge. The preferred option is to discharge surface water to a drain managed by the Internal Drainage Board (IDB). An alternative discharge route (following segregation, treatment and attenuation) is also proposed, should this be required, via the existing Keadby 1 Power Station cooling water outfall. Specific details regarding control of discharges are set out in **ES Volume I Chapter 12**: Water Environment and Flood Risk (**Application Document Ref. 6.2**) and in the indicative drainage strategy in Annex A of **ES Volume II Appendix 12A**: Flood Risk Assessment (**Application Document Ref. 6.3**).

4.3.40. A new public water connection will be required from the Yorkshire Water main situated along Chapel Lane, including works to the existing public water pipelines within the Keadby Power Station site.

4.3.41. Foul drainage from permanent welfare facilities would be directed to the local sewerage system, subject to agreement with the local sewerage undertaker. The existing foul sewer connection within the wider Keadby Power Station Site would be utilised if it is found to be fit for purpose for life of development. If this is not the case, a package treatment plant will be used which will discharge into the cooling water outfall.

Chemical Storage

4.3.42. A number of chemicals will be required to be transported to, stored and used on the Main Site. The Main Site will therefore contain chemical storage facilities including road tanker unloading area.

4.3.43. Where any substance could pose a risk to the environment through its uncontrolled release (e.g. surface water drains), the substance will be stored within appropriate containment facilities including impermeable concrete surfaces and appropriately designed and sized bunds.

4.3.44. The inventory of materials to be stored on the Main Site will be developed through the detailed design. However, where storage of hazardous materials, individually or in-combination exceeds the relevant thresholds, separate permissions will be sought from the Health and Safety Executive (HSE) and local planning authority as appropriate for their storage, under the Planning (Hazardous Substances) Regulations 2015 (HMSO, 2015a) and Control of Major Accident Hazards Regulations 2015 (COMAH) (HMSO, 2015b) regimes. An Environmental Permit will be required for the operation of the

Proposed Development which will include conditions on the storage of all chemicals with the potential to cause pollution.

Heavy Goods Vehicle Movements

4.3.45. Heavy Goods Vehicles (HGVs) will use the A18 to access the Site. Operational traffic movements are described in **ES Volume I Chapter 10**: Traffic and Transport (**Application Document Ref. 6.2**). In summary it is anticipated that during the operational phase of the Proposed Development, total HGV movements at the Main Site will be around 15 in and 15 out per week. These figures include movements associated with delivery of consumables and removal of waste products.

4.3.46. The air quality, noise and transport assessments (**ES Volume I Chapters 8, 9** and **10** respectively in ES Volume I (**Application Document Ref. 6.2**)) consider the worst-case traffic profile relevant to that topic, which are associated with construction – a detailed assessment of the operational phase of the Proposed Development is not considered necessary as the vehicle numbers generated would be considerably lower than the screening threshold for a more detailed assessment (e.g. >200 vehicles per day).

4.3.47. Construction traffic movements are described in **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**).

Landscaping and Biodiversity

4.3.48. The Proposed Development would include provision of landscaping, planting and biodiversity enhancement works.

4.3.49. An **Outline Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) Report** accompanies the Application (**Application Document Ref. 5.10**). This document sets out the principles of habitat creation, management and enhancement and of landscape design that will be adopted in the detailed design process and the areas of the Site allocated for this purpose, as well as the existing areas of planting to be retained, protected and managed. Implementation of the proposed measures would be secured by a Requirement of the **Draft DCO** (**Application Document Ref. 3.1**).

Security Fencing and Gates

4.3.50. Security systems are provided in respect of the Main Site. This includes paladin (or similar) fencing, intruder alarms and may include turnstiles (or similar) for the Main Site to manage people access.

4.3.51. Closed circuit television (CCTV) and other security measures are anticipated to be required for security purposes at the Site.

4.4. Design Parameters

4.4.1. The design of the Proposed Development is not yet finalised and will not be completed until the detailed design phase. However, the final design will be within the parameters assessed by the EIA, which will be presented in the draft DCO. The evolution of the Proposed Development to date is outlined in **ES Volume I Chapter 6**: Consideration of Alternatives (**Application Document Ref. 6.2**).

4.4.2. Table 4.1 sets out the maximum dimensions for the main components of the Proposed Development which have been used as the basis for the various technical assessments. Although design work is ongoing, maximum and minimum parameters have been devised to enable the EIA to progress in the absence of the final design information and to enable the compilation of a robust assessment, based on a reasonable and appropriate worst-case option.

4.4.3. Existing natural ground levels at the Main Site are approximately 0m to 1m Above Ordnance Datum (AOD) on the northern part of the Main Site and typically 1m to 2m AOD in the southern part of the Main Site. In the southern part of the Site, adjacent to the A18, ground levels are approximately 2m AOD.

4.4.4. Proposed ground elevations and final finished ground levels have been informed by flood risk assessment modelling presented in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**).

4.4.5. Table 4.1 sets out the parameters that have been assessed within this ES for the Proposed Development. Maximum heights of buildings and other structures are given in m AOD. For buildings and structures within the Main Site and Ancillary Facilities areas, these parameters take into account the anticipated finished ground level of +3.0m AOD for CCGT infrastructure including the administration/ control building that would provide a safe place of refuge in a flood defence breach event. There is no land raising proposed in the area of the A18 Gatehouse, hence the AOD height of the A18 Gatehouse in Table 4.1 is estimated to be 2.0m greater than the building height above ground level, in accordance with the current ground level. A safe place of refuge for staff working at this location in the event of a flood defence breach will be provided.

4.4.6. Following further (ongoing) engagement with technology providers since the publication of the PEI Report the design has evolved and the anticipated maximum parameters that were set out in PEI Report **ES Volume, I Chapter 4**: The Proposed Development (**Application Document Ref. 6.2**), have been refined. The design parameters used within the ES are reflected in Table 4.1 below. The refinement of the parameters relate to the dimensions of the HRSG building (increased by 5m in length and width and by 2m in height), the length and height of the cooling towers (increased by 47m and 2m respectively) and the diameter of the stack (increased by 0.5m external

diameter and by 0.4m internal diameter). The height of the tallest structure (the stack) remains the same as reported and assessed in the PEI Report at 85m. A summary of all design refinements since the publication of the PEI Report is provided in **ES Volume I Chapter 6:** Consideration of Alternatives (**Application Document Ref. 6.2**).

4.4.7. An accompanying indicative layout drawing is presented as **ES Volume III Figure 4.1:** Main Site Layout (**Application Document Ref. 6.4**). Elevations drawings are provided as part of the **Indicative Proposed Power Station Layout, Elevations and Sections Plans** which accompany the Application (**Application Document Ref 2.6**).

Table 4.1: Maximum Design Parameters (including limits of deviation)

Component	Length (m)	Width (m)	Height (m) above ground level (AGL)	Height (m AOD)
Minimum design level (final ground height) within Main Site and Ancillary Facilities areas	3.0m AOD			
Gas Turbine Hall	23	53	32	35.0
Gas Turbine Generator Hall	28	22	24	27.0
Steam Turbine Hall	58	61	39	42.0
HRSG Building	33	74	58	61.0
Stack	Up to 9m external diameter (8.4m internal diameter)		85	88.0
Hybrid Cooling Towers	170	38	25	28.0
A18 Gatehouse	6	7	6	8.0

4.4.8. In addition to the flood mitigation measure of land raising to 3.0m AOD, further measures are proposed for critical operational infrastructure associated with the CCGT (defined in paragraph 5.3.8 of **ES Volume II**

Appendix 12A: Flood Risk Assessment (**Application Document Ref. 6.3**) that provide an additional level of resilience of no less than 4.0m AOD.

4.4.9. The exact positions of the CCGT stack cannot be fixed until the detailed design stage as it will depend on the final technical configuration and plant optimisation. The height of the stack above ground will also depend on the final finished ground level.

4.4.10. In assessing effects on landscape and visual amenity and setting effects on built heritage receptors, the assessment is based upon the largest possible dimensions for the Proposed Development, and a worst-case stack height of up to 85m AGL (88m AOD), as these are considered most likely to result in significant effects and represent the worst case scenario. The maximum dimensions are based upon the widest building footprint and tallest potential height as detailed in Table 4.1. **ES Volume I Chapter 14**: Landscape and Visual Amenity (**Application Document Ref. 6.2**) and **Chapter 15**: Cultural Heritage (**Application Document Ref. 6.2**) describe this further.

4.4.11. As outlined in **ES Volume I Chapter 2**: Assessment Methodology (**Application Document Ref. 6.2**) in order to determine whether the potential future removal of Keadby 1 Power Station structures would provide a worst case, this additional scenario has also been considered in the assessment of landscape and visual amenity and built heritage aspects in **ES Volume I Chapter 14**: Landscape and Visual Amenity (**Application Document Ref. 6.2**) and **Chapter 15**: Cultural Heritage (**Application Document Ref. 6.2**).

4.5. Proposed Development Operation

Operational Modes

4.5.1. The Proposed Development is designed to be able to operate in either baseload or in a flexible (dispatchable) mode.

4.5.2. A CCGT power station capable of running in both baseload and dispatchable modes is:

- able to provide robust utility scale power throughout the year;
- responsive to seasonal demand fluctuation;
- responsive to daily demand fluctuation (flexible power);
- able to address renewables intermittency (in particular wind and solar) by replacing the electricity supplied by renewables at time of low renewable generation capacity; and
- able to adapt to a changing market in the future (i.e. an increase in renewables capacity).

4.5.3. There is the opportunity for the Proposed Development to be able to operate in baseload (i.e. generation that generally runs continuously throughout the year) or dispatchable mode (i.e. being able to export power into the day-ahead market to match the anticipated intermittency of renewable power in

the future power market). Operating in baseload mode could involve up to 20 start-up/ shutdown cycles per year, whereas operating in dispatchable mode could, in principle, involve up to 200 start-up/ shutdown cycles per year or more. The operational mode is not relevant to all EIA topics but where it is relevant (i.e. the topics mentioned in the next sentence), a reasonable worst case has been adopted. For **ES Volume I Chapter 8**: Air Quality (**Application Document Ref. 6.2**), **ES Volume I Chapter 9**: Noise and Vibration **(Application Document Ref. 6.2), ES Volume I Chapter 11:** Biodiversity and Nature Conservation (**Application Document Ref. 6.2**) and **ES Volume I Chapter 12**: Water Environment and Flood Risk **(Application Document Ref. 6.2),** baseload operation has been assumed as this is considered to be a worst case in terms of environmental impacts, with the Proposed Development operating all the time. For **ES Volume I Chapter 18**: Climate Change and Sustainability (**Application Document Ref. 6.2**) which provides a lifecycle assessment of greenhouse gas (GHG) emissions, a stepped operating hours profile over the lifetime of the Proposed Development has been assumed. This is considered to represent a reasonable worst case over that lifetime, reflecting the expected reduction in dispatchable plant use over time.

4.5.4. The combustion emissions (NOx (and CO for natural gas operation)), and ammonia (NH_3) from the SCR) would be subject to the relevant emission limit, as detailed in paragraph 4.3.18.

Fuel Scenarios

4.5.5. The Proposed Development will be designed to run on 100% hydrogen. However, it is currently anticipated that the required hydrogen supply chain may not be available at the start of operation. In this case, the Proposed Development would also need to be able to operate using 100% natural gas and blends of natural gas and hydrogen whilst a commercially viable and reliable hydrogen supply chain option is made available to the Site. In line with Government policy, it is recognised that developments such as the Proposed Development are needed to stimulate investment in the development of hydrogen production, storage and supply infrastructure. Large scale hydrogen-fired power generation is also a key part of the need case for hydrogen storage projects in the Humber.

4.5.6. The timing of the fuel switchover (and any intermediate operational period using a blend of natural gas and up to 100% hydrogen) cannot be confirmed at this time, as the timing of hydrogen supply to the Site is subject to the successful progression of UK Government allocation processes for hydrogen production, transport and storage, and may not be confirmed until the Proposed Development is operational. However for the purposes of the greenhouse gas emissions assessment presented in **ES Volume I Chapter 18:** Climate Change and Sustainability (**Application Document Ref. 6.2**), as requested in the EIA Scoping Opinion a range of potential scenarios has been identified, using 100% hydrogen, 100% natural gas and blends of

natural gas and hydrogen with some considered more likely (as aligned to Government policy and the Applicant's corporate policy) and some considered less likely (given the Government intention to target clean sources producing at least as much power as Great Britain consumes in total over a typical weather year and at least 95% of Great Britain's generation with a maximum of 5% from unabated gas by 2030).

Hours of Operation

4.5.7. The facility will be designed to operate up to 24 hours per day, 7 days per week with programmed offline periods for maintenance.

Staff

4.5.8. Operation of the Proposed Development is anticipated to create approximately 50 full-time operational roles.

4.5.9. Plant operative staff will typically work on a two 12-hour shift pattern, with the first shift between 07:00 - 19:00 and the second between 19:00 - 07:00.

4.5.10. Administrative staff will typically work an office-hour pattern of 08:30 – 16:30.

4.5.11. Temporary and contractor employees associated with maintenance activities would also be employed, as required.

Process Inputs

4.5.12. The Proposed Development will use various raw materials during operation. Except for hydrogen/ natural gas and water, these will predominantly be delivered to the Proposed Development by road tanker. Storage capacity at the Site has been designed to reflect the process requirements and delivery capability.

4.5.13. As is the case for existing gas-fired power stations, fuel (hydrogen and/ or natural gas) will not be stored within the Site because it is not practical to store the amount of fuel that would be required to enable the Proposed Development to continue operating in the event of a fuel supply problem.

4.5.14. Materials including chemicals to be stored and used within the Main Site will be subject to control via the Environmental Permit, COMAH Licence (if applicable) and other necessary consents required, and are anticipated to include the following process chemicals:

- power plant treatment chemicals (alkalising agent (e.g. ammonia), oxygen inhibitor, hardness stabiliser, SCR reagent (ammonia or urea) and phosphate);
- water treatment plant chemicals (e.g. biocides, antiscalants, sulphuric acid, sodium hydroxide);
- hydrogen for generator cooling; and

- cooling tower chemicals (e.g. biocides, sulphuric acid, hardness stabiliser and corrosion inhibitors).

4.5.15. Other chemicals required for routine cleaning, maintenance and emergency uses include:

- liquid fuel;
- nitrogen (natural gas system and other equipment purge);
- cleaning chemicals;
- acetylene (metal cutting);
- inert fire-fighting gases;
- lubricating oils; and
- carbon dioxide for purging of electrical generators for maintenance purposes.

4.5.16. In order to reduce the risks of contamination to processes and surface water, all liquid chemicals stored on site will be kept in bunded controlled areas. These areas will have a volume of either 110% of the greatest tank storage capacity or 25% of the total storage where multiple tanks and containers are located and be appropriately segregated.

Maintenance

4.5.17. The objective of plant maintenance is to ensure the Proposed Development including utility connections operates safely and reliably. Inspection and maintenance activities have informed the Proposed Development footprint and layout. Areas for permanent laydown and turnaround areas for maintenance are included in the Main Site.

4.5.18. Routine maintenance will be planned and scheduled via the maintenance management system with scheduled maintenance outages occurring approximately once every two to five years depending on the nature of plant operations in that period. These maintenance activities will require additional contractors to work on-site. The contractors will access the Main Site via the main entrance off the A18.

4.5.19. The maintenance strategy to be adopted will use established methods such as Risk Based Inspection (RBI) and Reliability Centred Maintenance (RCM) to support the required facility availability. Therefore, to support the maintenance strategy for the Proposed Development facilities, each major equipment item will be provided with appropriate access and overhaul laydown areas and the internal road layout for the Main Site will be designed to enable free movement for cranes and heavy lifting equipment.

4.5.20. It is anticipated that an integrated Operations and Maintenance (O&M) team will have responsibility for daily operations, including troubleshooting and effecting minor repairs on the Main Site. Major and specialist O&M interventions (turnarounds, CCGT scheduled maintenance and turbine

overhauls, etc) are likely to be outsourced and major equipment items serviced by original equipment manufacturers (OEM).

4.5.21. If required, pipeline inspection plans will be prepared and Pipeline Inspection Gauge ('pig') launching and receiving facilities for intelligent 'pigging' operations will be considered.

4.5.22. It is intended that major maintenance activities be harmonised around the longest or most constrained outages. For example, it is likely that planned maintenance of the Proposed Development will be scheduled to not coincide with other planned outages at the Keadby Power Station Site.

Hazard Prevention and Emergency Planning

4.5.23. The Applicant aims to protect human health by safely and responsibly managing activities on the Site. A Health and Safety Plan covering the works, commissioning and operation of the Proposed Development will be prepared by the Applicant. For design and construction, a competent and adequately resourced Construction (Design and Management) (CDM) Coordinator and Principal Contractor will be appointed. The Applicant will ensure that its own staff, its designers and contractors follow the Approved Code of Practice (ACoP) defined by the CDM Regulations 2015.

4.5.24. Written procedures clearly describing responsibilities, actions and communication channels will be available for operational personnel dealing with emergencies. Procedures will be externally audited, and contingency plans written in preparation for any unexpected complications.

4.5.25. As noted in paragraph 4.3.44, the inventory of materials to be stored on the Main Site will be finalised through the detailed design and separate permissions will be sought from the HSE and local planning authority under the COMAH and Hazardous Substance Consent regimes respectively, where required. The project is currently working on the basis that lower tier COMAH will apply to the Site operations as a minimum, but this will only be confirmed during detailed design once all chemicals required have been identified along with the quantities which exist within the Site. All chemical storage will be regulated by the Environment Agency through an environmental permit that will be required for the operation of the Proposed Development.

4.5.26. The HSE is a statutory consultee for all Nationally Significant Infrastructure Projects (NSIP), such as the Proposed Development therefore consultation with the HSE will be undertaken and ongoing through the detailed design process.

4.5.27. The Proposed Development is using 'safety in design' principles to take into consideration safety issues and risks and to enable the ongoing design to reduce risks from the installation as a whole to as low as reasonably practicable (ALARP). As part of the layout evolution, the following safety in design mitigation hierarchy has been adopted:

- eliminate a hazard; in preference to
- control the hazard; in preference to
- provide personal protective equipment (PPE).

4.5.28. Design mitigation at the current concept design stage includes generic hydrogen hazards, corresponding mitigation measures, and key design modifications necessary for safe operation with hydrogen as the primary fuel. Considerations include (but are not limited to):

- preventative measures for fire and explosion risks, installing gas and flame detectors, and implementing ignition source controls.
- management of overpressure risks can be managed using pressure relief valves and emergency shutdown valves
- leak detection through catalytic detection, leak tests, and ensuring gas-tight connections, while mechanical damage can be mitigated by installing physical barriers.
- positioning of equipment containing hydrogen in uncongested, elevated areas to enhance gas diffusion and minimize explosion impacts, and use of physical barriers to prevent accidental damage
- modification of fuel supply equipment for flow rate and material suitability for hydrogen duties.
- incorporation of hydrogen specific leak detection systems, enhanced gas turbine (GT) enclosure ventilation, upgraded fire detection and protection systems, electrical equipment upgrades to IEC Ex IIC standards, and inert gas purging in the fuel system.
- modification of gas turbine combustion systems ensuring the use of H2-compatible materials, and modification of control and protection measures to ensure a secure and stable combustion process.

4.5.29. A preliminary Quantitative Risk Assessment (QRA) and Fire and Explosion Risk Assessment (FERA) have been carried out to identify the Major Accident Hazards – Worst-Case Scenarios associated with aspects of the design, the systems and operation of the proposed facility as known at the Pre-FEED ('pre - Front End Engineering Design') stage. The objectives of the preliminary QRA and FERA were to demonstrate that there are no critical drawbacks or regulatory non-compliance and provide any appropriate recommendations for the next stage of design. As a result of the preliminary QRA and FERA, some opportunities for minor adjustments to the indicative layout of the Proposed Development have been identified but the adjustments would not result in any changes to the Site boundary or the identified effects within the EIA Assessment.

4.5.30. **ES Volume I Chapter 19**: Major Accidents and Disasters (**Application Document Ref. 6.2**) provides an assessment of effects of the Proposed Development on the environment arising from the vulnerability of the Proposed Development to risks of relevant major accidents or disasters, including measures envisaged to prevent or mitigate the any likely significant

adverse effects and details of preparedness for and response to emergencies.

Routine and Emergency Access/ Egress

4.5.31. Permanent access to the Main Site during operation would be via the existing road access road from the A18 which passes via the existing North Pilfrey Bridge over the Stainforth and Keadby Canal and the Scunthorpe to Doncaster passenger rail line (refer to **ES Volume III Figure 3.3:** Indicative Parts of the Site Plan (**Application Document Ref. 6.4**)). Vehicles would access the Main Site from the A18, via this existing access road/ Bonnyhale Road/ existing private access roads and a new main access road to be constructed into the Main Site.

4.5.32. A new security gatehouse and parking would be provided at the entrance to the Site, set back from the A18. It has been identified since the publication of the PEI Report that it may be more efficient for this gatehouse to have its own local utilities connections (electricity, water, telecommunications, foul drainage) rather than connecting to those of the Main Site, due to its location which is remote from the Main Site. Land around the A18 access road junction has therefore been included in the Site boundary as identified in paragraph 3.3.2 of **ES Volume I Chapter 3:** The Site and Surrounding Area (**Application Document Ref 6.2**).

4.5.33. The Main Site includes a main car park, including muster point in the event of emergency, a manned gatehouse and a control building which would be designed as a place of safety in the event of emergency.

4.5.34. A secondary emergency access (both pedestrian and vehicular) from the Main Site will be available onto Chapel Lane. This will comprise the maintenance and improvement of an existing private track running between the Main Site and Chapel Lane, including a new private bridge over Drain 1 to the north of the Main Site. The emergency access will be gated, and under normal operation this gate will be closed and unmanned.

4.5.35. The locations of these access points are illustrated on **ES Volume III Figure 3.3**: Indicative Parts of the Site Plan (**Application Document Ref. 6.4**).

External Lighting

4.5.36. An **Outline Lighting Strategy** is included in the Application (**Application Document Ref. 5.11**). Before any lighting is installed, a detailed lighting scheme will be submitted to the local planning authority for approval. The external lighting scheme will be designed in accordance with relevant standards, including the Guidance Notes for the Reduction of Obtrusive Light (2020) published by the Institute of Lighting Engineers and/ or Chartered Institution of Building Services Engineers (CIBSE) requirements, as appropriate.

4.5.37. The external lighting scheme will be designed to provide safe working conditions in all relevant areas of the Site whilst reducing light pollution and the visual impact on the local environment. This is likely to be achieved using luminaires that eliminate the upward escape of light.

Environmental Management

4.5.38. The Proposed Development will comply with the Environmental Permitting (England and Wales) Regulations 2016 (as amended) under its Environmental Permit so that any impacts of emissions to air, soil, surface and groundwater to the environment and human health will be minimised and avoided where possible.

4.5.39. The Site will be operated in line with appropriate standards and the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation (ISO) 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development is operating to the appropriate standard.

4.5.40. Sampling and analysis of pollutants will be undertaken where required including monitoring of exhaust emissions levels using CEMS, prior to discharge from the stacks, in accordance with the Environmental Permit.

4.6. Decommissioning

4.6.1. The Proposed Development has a design life of approximately 25 years. After this period, it is expected that the Proposed Development will have some residual life remaining, and an investment decision would then be made based on the market conditions prevailing at that time. If the operating life were to be extended beyond the initial design life, if appropriate, the Proposed Development would be upgraded in line with the legislative requirements at that time.

4.6.2. At the end of its operating life, it is anticipated that all above-ground equipment associated with the parts of the Proposed Development will be decommissioned and removed from the Proposed Development Site. Prior to removing the relevant plant and equipment, all residues and operating chemicals will be cleaned out from the plant and disposed of in an appropriate manner.

4.6.3. The design of the Proposed Development will seek to use recyclable materials wherever possible to aid recycling of materials during the decommissioning and demolition phase. It is expected that the bulk of the relevant plant and equipment will have some limited residual value as scrap or recyclable materials, and the demolition contractor will be encouraged to use demolition working practices that enable effective recycling of the construction materials used.

4.6.4. Prohibited materials such as asbestos, polychlorinated biphenyls (PCB), ozone depleting substances and carcinogenic materials will not be allowed within the design of the Proposed Development. Other materials recognised to pose a risk to health, but which are not prohibited, will be subject to a detailed risk assessment.

4.6.5. Prevention of contamination is a specific requirement of the Environmental Permit for the operation of the Proposed Development and therefore it is being designed such that it will not create any new areas of ground contamination or pathways to receptors as a result of construction or operation. Once the relevant plant and equipment have been removed to ground level, it is expected that the hardstanding and sealed concrete areas will be left in place. Any areas of the Proposed Development which are to be decommissioned that are below ground level will be backfilled to ground level to leave a levelled area.

4.6.6. A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) will be produced within the period specified in the relevant legislation in force at the time of cessation of operations and agreed with the Environment Agency as part of the Environmental Permit and site surrender process. The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed. This will include details of how surface water drainage should be managed during decommissioning and demolition.

4.6.7. The Decommissioning Plan will include an outline programme of works. It is anticipated that it would take up to a year to decommission the Main Site, with demolition following thereafter, i.e. taking at least two years to complete. Any demolition contractor would have a legal obligation to consider decommissioning and demolition under the CDM Regulations 2015, or the equivalent prevailing legislation at that time.

4.6.8. Decommissioning activities will be conducted in accordance with the appropriate guidance, legislation and relevant consents from the Local Authority at the time of the Proposed Development's closure. All decommissioning activities will be undertaken in accordance with the waste hierarchy. Materials and waste produced during decommissioning and demolition will be stored in segregated areas to maximise reuse and recycling. All materials that cannot be reused or recycled will be removed from the Site and transferred to suitably permitted waste recovery/disposal facilities. It is anticipated that a large proportion of the materials resulting from demolition will be recycled and a record will be kept in order to demonstrate that the maximum level of recycling and reuse has been achieved.

4.6.9. Upon completion of the decommissioning programme, including any remediation works that might be required, the Environment Agency will be invited to witness a post-decommissioning inspection by site staff. All records from the decommissioning process will be made available for inspection by

the Environment Agency and other relevant statutory bodies, in accordance with the Environmental Permit requirements.

4.7. References

- British Standards Institute 2015 (+A1: 2016) Document PD 8010: Code of practice for Pipelines – Part 1: Steel pipelines on land.
- COMMISSION IMPLEMENTING DECISION (EU) 2021/2326 of 30 November 2021 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants (notified under document C (2021) 8580) Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D2326&qid=1725362244302 [Last accessed 03 September 2024].
- Department of Energy and Climate Change (2009) Carbon Capture Readiness – A Guidance Note for Section 36 Electricity Act 1989 Consent Applications. Available online: https://www.gov.uk/government/publications/carbon-capture-readiness-ccr-a-guide-on-consent-applicationspdf [Accessed 03 September 2024].
- Department for Energy Security and Net Zero and Department for Business Energy and Industrial Strategy (2021). Net Zero Strategy: Build Back Greener. Available online: https://www.gov.uk/government/publications/net-zero-strategy [Accessed: 14 May 2025].
- Department for Energy Security and Net Zero (2024). UK Hydrogen Strategy. Available online: https://www.gov.uk/government/publications/uk-hydrogen-strategy [Accessed 14 May 2025].
- Department for Energy Security and Net Zero (2025). Clean Power 2030 Action Plan. Available online: https://www.gov.uk/government/publications/clean-power-2030-action-plan [Accessed 14 May 2025].
- Environment Agency (2025) *Decarbonisation readiness: proposed guidance*. Available online: https://www.gov.uk/government/consultations/decarbonisation-readiness-proposed-guidance/decarbonisation-readiness-proposed-guidance [Accessed: 04 June 2025].
- European Commission (2017) Best available techniques Reference document for Large Combustion Plants. Available online: https://op.europa.eu/en/publication-detail/-/publication/c31e5e11-db60-11e7-a506-01aa75ed71a1/language-enf [Accessed 03 September 2024].
- HM Treasury (2016) National Infrastructure Delivery Plan 2016 to 2021. Available online: https://www.gov.uk/government/publications/national-infrastructure-delivery-plan-2016-to-2021 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/381884/2902895_NationalInfrastructurePlan2014_acc.pdf [Accessed: 03 September 2024].

- HM Government (2013) *The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013.* Available online: https://www.legislation.gov.uk/uksi/2013/2696/contents [Accessed: 04 June 2025]
- Institute of Lighting Professionals (2021). Guidance Notes for the Reduction of Obtrusive Light. Available online: https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/ [Accessed: 03 September 2024].
- National Infrastructure Commission (2020). Net Zero - Opportunities for the Power Sector. Available online: https://nic.org.uk/app/uploads/Net-Zero-6-March-2020.pdf. [Accessed: 03 September 2024].
- Planning Inspectorate (2024) Advice Note Nine: Rochdale Envelope, Version 3, July 2018. Available online: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope
- Planning Inspectorate (2024) Advice Note Eleven: Working with public bodies in the infrastructure planning process, Version 4, May 2024. Available online: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-eleven-working-with-public-bodies-in-the-infrastructure-planning-process/nationally-significant-infrastructure-projects-advice-note-eleven-working-with-public-bodies-in-the-infrastructure-planning-process
- Secretary of State for Business, Energy and Industrial Strategy (2020). The Energy White Paper - Powering our Net Zero Future. Available online: https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future [Accessed: 03 September 2024].
- Secretary of State for Environment (2013) The Carbon Capture Readiness (Electricity Generating Stations) Regulations. Available online: https://www.legislation.gov.uk/uksi/2013/2696/introduction [Accessed 14 May 2025].
- The Construction (Design and Management) Regulations 2015 (SI 2015 No.51). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/2015/51/contents/made [Accessed: 03 September 2024].
- The Control of Major Accident Hazards Regulations 2015 (SI 2015 No.483). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/2015/483/contents/made [Accessed: 03 September 2024].
- The Eels (England and Wales) Regulations 2009. (SI 2021 No. 3344). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/2009/3344 [Accessed: 03 September 2024].
- The Environmental Permitting (England and Wales) Regulations 2016 (SI 2024 No. 1154). London: The Stationery Office. Available online:

https://www.legislation.gov.uk/uksi/2016/1154/contents [Accessed: 03 September 2024].

- The Marine and Coastal Access Act 2009 (c. 23) . London: The Stationery Office. Available online: https://www.legislation.gov.uk/ukpga/2009/23/contents [Accessed: 03 September 2024].
- The Marine Licensing (Exempted Activities) Order 2011 (SI 2011 No.409). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/2011/409/contents
- The Pipeline Safety Regulations 1996 (SI 1996 No.825). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/1996/825/contents/made [Accessed: 03 September 2024].
- The Planning (Hazardous Substances) Regulations 2015. (SI 2015 No. 627). London: The Stationery Office. Available online: https://www.legislation.gov.uk/uksi/2015/627/contents/made [Accessed: 03 September 2024].